

Neurosurgery Course (655) Syllabus

Course Title: NS655.Neurosurgery **Website:** <http://neurosurgery.umc.edu>

Duration: 4 weeks – Monday through Friday and one weekend

Periods Offered: All

Maximum Enrolled Per Period: 2

Course Description: This rotation is most applicable to students interested in learning more about neurosurgery, in preparation for a career in the clinical neurosciences. During the rotation, the students will receive further exposure to clinical neurosurgery and basic neuroscience. The clerkship will enhance the student's ability to do a pertinent history and exam and formulate a differential diagnosis and plan of evaluation, including the need for special diagnostic procedures. Pre- and post-operative neurosurgical problems will be managed. The student will also gain exposure to neurosurgical procedures. Students will participate as sub-interns and will be assigned to an attending preceptor and resident team. They will attend outpatient clinics; assist in day-to-day inpatient and operative care of neurosurgical patients; take regular night call; and participate in scheduled teaching activities.

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Department of Neurosurgery

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Course Activities: At the beginning of each rotation, each medical student will be assigned to one of the clinical neurosurgery services. There are two adult neurosurgery services (Spine/Trauma and Cranial) and there is one pediatric service. Each student will be expected to make early morning rounds with the resident staff on their assigned service and also afternoon rounds when appropriate. Students are encouraged to spend as much time in the operating room as possible, but are also encouraged to spend some non-operative time in the clinics seeing patients. A minimum of 30 to 40 percent of your time should be spent in clinic. The chief resident of your team will assign you to O.R. or clinic daily. Each student will be expected to take one night on call per week, for a total of 4 on-call days including one weekend day. (You may be excused at noon the following day unless there are ongoing activities that you wish to participate in). Please page the on-call Neurosurgery resident with your contact information at 5 pm on your chosen call night.

Course Objectives:

MEDICAL KNOWLEDGE

Fundamentals of Neuroimaging

1. Recognize common spine fractures and dislocations
2. Differentiate on computerized images between blood, air, fat, CSF, and bone
3. Distinguish the typical imaging characteristics of epidural hematoma, acute subdural hematoma, chronic subdural hematoma, intracerebral hemorrhage, and subarachnoid hemorrhage and tumor.

Intracranial Hypertension

1. Define cerebral perfusion pressure, and explain how it is used in the management of patients with elevated intracranial pressure
2. Describe how blood gases, fluids, and electrolyte balance influence intracranial pressure
3. Describe clinical manifestations of acute brain herniation, including transtentorial, uncal, & subfalcine herniation syndromes.

Diagnosis and Management of Ischemic Cerebrovascular Disease

1. Distinguish the symptoms and signs of anterior and posterior circulation ischemia
2. Differentiate the radiographic presentations of the different types of ischemic stroke: embolic, hemodynamic, and lacunar
3. Describe the roles and indications of the following treatment options in ischemic disease: medical management, risk factor modifications and surgical therapy.
4. Describe the role of open CEA to endovascular stent for carotid stenosis.

Diagnosis and Management of Intracerebral Aneurysm/AVM

1. Distinguish and define the signs and symptoms of ruptured and un-ruptured aneurysm/AVM
2. Differentiate the radiographic presentation of ruptured vs. un-ruptured aneurysm/AVM
3. Describe & understand the indications for treatment & the various treatment modalities underlying cerebrovascular disease and the management, thereof.

Diagnosis and Management of Intracranial and Spinal Tumor

1. Distinguish and define the signs and symptoms of intracranial or spinal tumor
2. Describe the diagnostic significance and prognostic importance in distinguishing metastatic cerebral or spinal disease from a primary process
3. Understand the treatment alternatives dependent on the pathology: open surgical resection vs. gamma-knife radiosurgery vs. whole brain/spine radiation

Diagnosis and Management of Nontraumatic Neck and Back Problems

1. Define radiculopathy, myelopathy, and cauda equine syndrome
2. Describe the general management of cervical disc herniation, lumbar disc herniation, lumbar instability, and low back pain
3. List the most common examples of extradural, intradural-extramedullary, and intramedullary spine tumors

Diagnosis and Management of Peripheral Nerve Injury and Entrapment

1. Describe the differences in the management of sharp lacerating injuries, blunt lacerating injuries, gunshot wounds, stretch injuries, compression injuries, and avulsion injuries to peripheral nerves
2. Describe the signs and symptoms of carpal tunnel syndrome and ulnar neuropathy, and outline the surgical indications.

Diagnosis and Management of Hydrocephalus and Spinal Dysraphism

1. List common symptoms and signs of acute hydrocephalus in children
2. List common symptoms and signs of normal pressure hydrocephalus in adults
3. Define communicating and noncommunicating hydrocephalus and describe the differences in their treatments
4. List two examples each of open and closed spinal dysraphism
5. Describe the principles of management of myelomeningocele

Diagnosis and Management of Surgically Treatable Pain Problems, Movement Disorders, and Epilepsy

1. Describe the classic presentations of trigeminal neuralgia, failed back surgery syndrome, complex regional pain syndrome-1, and complex regional pain syndrome.
2. Describe the differences in indications for spinal cord stimulation versus spinal infusion pump
3. List at least one different surgical treatment each for Parkinson's disease, dystonia, spasticity, and hemifacial spasm
4. Define the different types of seizures (simple, partial, etc.)
5. Describe the differences between temporal lobectomy, lesionectomy, and disconnective surgery for seizure disorders

PATIENT CARE

The Neurological Examination

1. Evaluate patient's mental status and speech
2. Examine the cranial nerves
3. Examine central and peripheral sensory function
4. Examine motor function
5. Examine cranial and peripheral reflexes
6. Examine cerebellar function and gait

Diagnosis and Management of Head Trauma

1. Assign the Glasgow Coma Score
2. Initiate management of elevated intracranial pressure in head trauma
3. Define concussion, brain contusion, and diffuse axonal injury, and initiate management of each
4. Distinguish anatomically and radiographically acute subdural and epidural hematoma, & describe the surgical indications for each
5. Describe the initial management of penetrating high and low velocity head trauma
6. Describe the management of chronic subdural hematoma

Diagnosis and Management of Brain Tumor and Abscess

1. Know the relative incidence and location of the major types of primary and secondary brain tumors
2. Describe the general clinical presentations of brain tumors in the following locations: cerebral hemisphere, cerebellum, brainstem, pituitary, and cerebellopontine angle.
3. List the advantages and limitations of the following diagnostic tools used in the evaluation of brain tumors: CT, MRI, MR spectroscopy, and angiography
4. Describe the surgical indications for the most common benign and malignant tumors in the locations listed in #2
5. Describe the indication for, & the differences between radiotherapy and radiosurgery in the treatment of malignant brain tumors
6. List the major differences between the diagnosis and management of brain tumor and abscess
7. List the most common etiologies of cerebral abscess

Diagnosis and Management of Headache

1. Distinguish the radiographic presentation of the major causes of intracranial hemorrhage: hypertensive intracerebral hemorrhage, amyloid intracerebral hemorrhage, subarachnoid hemorrhage, arteriovenous malformation hemorrhage, tumor hemorrhage, and coagulopathy hemorrhage.
2. Apply the following diagnostic tools in evaluation of acute headache (CT, MRI, angiogram, and lumbar puncture)
3. Describe the broad treatment strategies (surgery, radiosurgery, interventional radiology as well as treatment of vasospasm) of intracranial aneurysms and vascular malformations
4. Differentiate the symptomatology of migraine, cluster, tension, and sinusitis headache

Spine Trauma

1. Describe the rapid assessment of the patient with spinal trauma
2. Recognize the common spine fractures on X-ray
3. Initiate acute management of spinal cord injury including immobilization, steroids, and systemic measures
4. Define the unstable spine

INTERPERSONAL AND COMMUNICATIONS SKILLS

Case Presentations

1. Present a case to your preceptor and include relevant history, neurological examination, imaging findings, and treatment plan

Participation on the Wards

1. Ask neurosurgical staff (residents, attendings, etc.) questions, as appropriate, to enhance learning opportunities both in and out of the OR.

PROFESSIONALISM

Operating Room

1. Demonstrate professionalism in the operating room; do not be disruptive, but feel free to participate, including asking questions, reviewing images, pathology, intraoperative findings, etc.
2. Demonstrate level of interest by scrubbing in on cases at the discretion of the resident and attending

Conferences

1. Attend all scheduled conferences
2. Feel free to participate and ask questions

Required Reading:

Each student should work through the Neurosurgery Gray Matter overview prior to their month at Neurological Surgery. Neurosurgery Gray Matter: An Educational Overview is available to you through the Congress of Neurological Surgeons at <http://w3.cns.org/education/sans.asp>. Please click on **Neurosurgery Gray Matter – A General Overview** in the left hand panel once you open the webpage. You should also obtain a copy of the reference book, Handbook of Clinical Neurosurgery, by Mark Greenberg.

Weekly Conference and Lecture Schedule and Class Activities:

All Conferences are on Wednesdays at the Methodist Rehab Center on the 2nd floor of the Atrium Mall in the Conference Center. Neurosurgery Clinical Conference is 7 am to 8 am and the Neuroscience Grand Rounds is from 8 am to 9 am. The resident's basic science lecture is from 9 am to 10 am.

Methods to Evaluate Student Performance:

Students are assessed based on participation, case discussions and observations.

Grading Scale:

We currently grade on a 100 point scale. (90 – 100 = A; 80-89 = B; 70-79 = C; 60-69 = D, 59 and below = failure)

Professionalism	25 %
Patient Care	25 %
Interpersonal Communication	25 %
Medical Knowledge	25 %
TOTAL	100 %